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Original Research Article

Clinical and hematological profile of newborns delivered to mothers with pregnancy induced hypertension: a tertiary centre study

Neerja Mishra[1]*, Arun Kumar Arya[1], Pavika Lal[2], Tanu Midha[3], Neelima Verma[4]

[1]Department of Pediatrics, GSVM Medical College, Kanpur, Uttar Pradesh, India
[2]Department of Obstetrics and Gynaecology, GSVM Medical College, Kanpur, Uttar Pradesh, India
[3]Department of Preventive and Social Medicine, GSVM Medical College, Kanpur, Uttar Pradesh, India
[4]Department of Pathology, GSVM Medical College, Kanpur, Uttar Pradesh, India

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***Correspondence:**
Dr. Neerja Mishra,
E-mail: neerja06mishra@gmail.com

ABSTRACT

Background: Pregnancy induced hypertension in women is a major cause of pregnancy related maternal, fetal, and neonatal morbidities and mortalities. Aim was to compare the clinical and hematological profile of newborns of mothers with and without pregnancy induced hypertension.
Methods: This hospital-based case control study was conducted in Lala Lajpat Rai Hospital, Kanpur. Clinical and hematological profile of newborns of mothers with or without PIH were compared.
Results: The low gestational age (35.44±2.89 weeks), low birth weight, thrombocytopenia (1.31±0.65 lakhs/mm^3), absolute neutropenia ($7.71\times10^3\pm5.24\times10^3$cells/mm^3) and deranged coagulation profile in newborns was found to have significant association with PIH in their mothers ($p<0.05$).
Conclusions: This study concluded that newborns of hypertensive mothers carry a risk for prematurity, smallfor gestational age, infection and bleeding in early neonatal life.

Keywords: Pregnancy induced hypertension, Low birth weight, Thrombocytopenia

INTRODUCTION

Gestational hypertension complicates 6% to 17% of nulliparous and 2% to 4% of multiparous women. Beyond 20 weeks of gestation, pre-eclampsia complicates 5% to 8% of pregnancies, and pre-eclampsia with severe features complicates <1% of pregnancies. The infants of hypertensive mothers have a significantly higher incidence of somatic growth retardation, low apgar scores, delayed adaptation, leucopenia and thrombocytopenia.[1]

Weight at birth is dependent almost entirely on maternal factors, and is the single most important factor determining survival and healthy development of babies.[2] Prematurity increases perinatal mortality and morbidity rates with immediate or late sequelae.[3] These infants may be at an increased risk of neonatal infections.[4]

Hematological abnormalities in infants born to hypertensive mothers can lead to sepsis, increased predisposition to infections and disseminated intravascular coagulation (higher in preterm than in term neonates). Bleeding manifestations including intracranial hemorrhage may result from platelet deficiency in these neonates.[5]

Aim and objectives

Aim and objective of the current study was to compare the clinical and hematological profile of newborns of mothers with and without pregnancy induced hypertension.

METHODS

Study type, location and duration

A hospital-based case control study was conducted in the Department of Pediatrics, Lala Lajpat Rai Hospital, Kanpur. The research was conducted between January 2021 and October 2022.

Sample size

A total of 100 neonates were recruited, 50 in case group and 50 in control group.

Inclusion criteria

Neonates born to mothers with PIH were enrolled as case while those with normotensive mothers were enrolled as control.

Exclusion criteria

The study excluded mothers who used aspirin, mothers with medical complications such as severe anemia, heart or respiratory disease, connective tissue disorder, and diabetes mellitus and new borns with significant congenital defects.

Study procedure

At birth, 2 ml of cord blood was taken and immediately subjected to an hour-long CBC and PT/INR analysis in ethylene diamine tetra acetic acid (EDTA) and citrate vials, respectively. The babies' clinical profiles were noted in the interim.

Statistical analysis

SPSS 22.0 was used to compile and evaluate the data. Percentages and Pearson's chi square test were employed for the analysis of categorical data. The t test, mean, and standard deviation were utilized for the analysis of quantitative variables, P value of less than 0.05 was considered significant.

RESULTS

Clinical details of the study and control groups are shown in the Table 1. The mean period of gestation of mothers in study and control groups were 35.44±2.89 weeks and 38.24±3.48 weeks of gestation, respectively. The difference observed was statistically significant ($p<0.01$). A significantly higher percentage of mothers with PIH (82%) needed operative delivery as compared to normotensive mothers.

A higher proportion of low-birth-weight babies (35.4%) were small for gestational age in the case group as compared to 30.4% SGA in the control group. A significantly higher number (74%) of newborns in the study group were preterm as opposed to only 40% in control group.

As in Table 2, in the study group mean total leucocyte count (TLC) was 13612±6734 cells/cubic meter as compared to control group where mean TLC was 16210±556 cells/cubic meter. The difference observed was statistically significant ($p<0.05$). Mean Absolute neutrophil count (ANC) in study and control group was $7.71\times10^3\pm5.24\times10^3$ cells/mm^3 and $9.92\times10^3\pm 5.65\times10^3$ cells/mm^3, respectively.

Table 1: Comparison of clinical data of case and control groups.

Clinical profile	Case, N (%)	Control, N (%)	P value
Mean period of gestation (weeks)	35.44±2.89	38.24±3.48	<0.01
Mode of delivery (operativedelivery)	41 (82)	32 (64)	<0.05
Low birth weight	31 (62)	23 (46)	>0.05
Small for gestation among LBW	11 (35.4)	7 (30.4)	0.06
Prematurity	37 (74)	20 (40)	<0.01
Gravida (primigravida)	24 (48)	21 (42)	>0.05

Table 2: Comparison of hematological profile of case and control groups.

CBC	Case group	Control group	P value
Haemoglobin (g/dl)	17.34±3.40	18.37±3.08	>0.05
TLC (cells/cubicmetre)	13612±6734	16210±556	<0.05
PCV	48.64±11.47	51.19±15.00	>0.05
MCV (fl)	101.216±18.81	99.54±25.17	>0.05
MCH (pg)	38.56±13.6	40.18±14.96	>0.05
MCHC (g/dl)	35.56±3.29	35.50±3.82	>0.05
Platelet count (lakhs/mm^3)	1.31±0.65	1.69±0.96	<0.05
ANC (cells/cubicmeter)	$7.71\times10^3\pm5.24\times10^3$	$9.92\times10^3\pm5.65\times10^3$	<0.05

The difference observed was statistically significant ($p<0.05$). The platelet count was significantly lower in study group (1.31±0.65 lakhs/mm^3) than control group (1.69±0.96 lakhs/mm^3). As shown in Table 3, in the study group, mean prothrombin time (PT) was 36.9±23 sec. This was significantly higher as compared to mean

prothrombin time in the control group (21.6±10 sec) ($p<0.05$).

Table 3: Comparison of coagulation profile of case and control groups.

Coagulation profile	Case group	Control group	P value
PT	36.9±23	21.6±10	<0.001
aPTT	42.23±8.48	41.86±10.66	>0.05

DISCUSSION

This study found that a higher proportion of low-birth-weight neonates (35.4) were small for gestational age in the study group as compared to 30.4 SGA in the control group (though statistically non-significant, p=0.06). This correlated with the study of Moutquin et al.[6] In this study 48 of mothers with PIH were primi gravida. This correlated with study by Bolat et al who found the frequency of preeclampsia in pregnant women ranges between 10-14 in primigravida and 5.7- 7.3 in multigravida.[7] In this study a significantly higher number of mothers in the study group were delivered by cesarean section (82) when compared to control (64) group to prevent complications for both mother and the fetus. This is in accordance with the study conducted by Sikha Maria Siromani et al in which about 70.67 of the PIH group mothers underwent caesarean section.[8] Preterm delivery occurred nearly two times (74) more frequently in hypertensive mothers than in the mothers with normal blood pressure (40) in our study. This was comparable with the study conducted by Nadkarni et al who showed 44.3 preterm deliveries while study by Yadav et al had 28.85 preterm deliveries.[9,10] In the hematological parameters, the most significant feature found in this study group was the presence of thrombocytopenia. This study found the mean platelet count of 1.31±0.65 lakhs/mm^3 in the study group. This result validates the findings of research conducted by El Sayed et al. Karem et al found the mean platelet count to be 2.46±0.81 lakhs/mm^3 that contradicted our study. The difference in mean MCV (101.216±18.81), MCH (38.56±13.6), MCHC (35.56±3.29) and mean PCV (48.64) in our study in the newborns of mothers with PIH versus normotensive mothers were statistically non-significant. Similar results were reported by Prakash et al.[13]

However, Sivakumar et al showed a significant difference in mean MCV, which was contrary to our findings.[14] The mean total leucocyte count (TLC) and neutrophil count in our study group was 13612 cells/mm^3 and 7.7×10^3 cells/mm^3, respectively and it was significantly lesser when compared to control group which had mean counts of 16210 cells/mm^3 and 9.90×10^3 cells/mm^3, respectively. This correlated well with Bolat et al, Prakash et al, and Cristina et al.[7,13,15] The study group's mean Absolute neutrophil count (ANC) was 7710 cells/mm^3, which was considerably lower than the control group's ANC of 9920 cells/mm^3. This finding correlated well with Dagar et al, Aundhakar et al, and Prakash et al.[13,16] We found that the study group's mean prothrombin time was substantially longer than the control group's PT, (21.6±10 sec vs 36.9±23 sec). Additionally, as the gestational age of the babies declined, Shivkumar et al noticed a significant correlation between PIH mothers andchanges in all coagulation markers in the neonates.[14]

Limitations

Stratified analysis of the newborns as newborns delivered to mothers with preeclampsia, eclampsia, and gestational hypertension was not done. Long term effects in the newborns were not studied.

CONCLUSION

It was concluded that newborns of mothers with PIH are more prone to preterm and operative delivery as compared to normotensive mothers. There was a positive association between PIH in mothers and thrombocytopenia, absolute neutropenia and coagulopathy in their newborns. Thus, newborns of hypertensive mothers carry a risk for both infection and bleeding in early neonatal life.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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